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A new species of *Terriera* (*Rhytismatales*, *Ascomycota*) from China

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Abstract —A new *Terriera* species, *T. huangshanensis* on leaves of *Eurya muricata* var. *huiana*, is described. The species is placed in *Terriera* based on the presence of strongly carbonized extensions adjacent to the ascoma opening, somewhat thin-walled cells at the marginal parts of the ascoma composed of colorless to light brown textura angularis-prismatica, and the absence of lip cells. The new species is similar to *T. minor*, which is distinguished by smaller ascomata with rounded ends, textura prismatica in the corner between the covering and basal stroma, paraphyses branching 2–3 times in the apical 30–40μm, sequentially ripening asci, and ascospores tapering towards the ends. The type specimen is deposited in the Herbarium of Forest Fungi of Anhui Agricultural University, China (AAUF).

Key words —taxonomy, *Rhytismataceae*, *Theaceae*

Introduction

Terriera B. Erikss. is a member of *Rhytismataceae* (*Rhytismatales*, *Leotiomycetes*, *Ascomycota*) (Kirk et al. 2008). Since Eriksson (1970) established *Terriera* as a new genus for *T. cladophila* (Lév.) B. Erikss., 17 species and 2 varieties have been reported. *Terriera* species are distributed worldwide and associate with both angiosperms and gymnosperms. In the past, members of this genus were placed in *Lophodermium* Chevall., *Hypoderma* De Not., *Clithris* (Fr.) Bonord., and *Dermascia* Tehon (Johnston, 2001). Although the classifications of Höhnel (1917) and Tehon (1935), based heavily on developmental characteristics of the ascomatal primordium, have been criticized and rejected by later researchers, they appear highly significant for recognizing *Terriera* as phylogenetically distinct from the highly heterogeneous *Lophodermium* s. lat. (Lantz et al. 2011). Ortiz-García et al. (2003) noted that '*Terriera minor* differs from *Lophodermium* in structure of the ascomatal primordium.' Johnston (2001) emphasized the importance of characters such as ascus and ascospore size, apical shape of the ascus and paraphysis, and features of the conidiomata

in his taxonomy of *Terriera*. Therefore in Johnston (2001) and Ortiz-García et al. (2003), he accepted into the genus several species with a typically *Terriera*-like ascoma such as *Clithris arundinacea* Penz. & Sacc., *Hypoderma fuegianum* (Speg.) Kuntze, *Lophodermium javanicum* Penz. & Sacc., and *L. sacchari* Lyon. Ortiz-García et al. (2003) attempted to explain phylogenetic relationships within *Lophodermium* by rDNA-ITS sequence analyses of *Lophodermium* species and representatives of other rhytismataceous genera. The results showed that *Lophodermium* from pine hosts formed an independent clade with *Meloderma* Darker and *Elytroderma* Darker but were distally related to *Terriera*. A more comprehensive survey by Lantz et al. (2011) indicated that *Terriera* is monophyletic, while *Lophodermium* as currently circumscribed contains as many as 10 independently evolved species clusters.

For China, only one species of *Terriera*, *T. brevis* (Berk.) P.R. Johnst., was reported in Hong Kong (Fröhlich & Hyde 2000). In the present paper we describe a new *Terriera* species from the Huangshan Mountains in Anhui Province, China.

Materials & methods

Mature fruit bodies were selected from the collected specimen. External shapes, size, color and opening ways of ascomata and conidiomata as well as zone line were observed under the dissecting microscope. Materials were then rehydrated in water for 15min, after which 10–15 μm thick fruitbody sections were cut by a freezing microtome and mounted in lactic acid or cotton blue with water pretreatment for viewing outlines of ascomata and conidiomata in vertical section. Gelatinous sheaths surrounding ascospores and paraphyses were examined in water or 0.1% (w/v) cotton blue in lactic acid. Color of diversified structures and ascospore contents were observed in water. Measurements and drawings were made using materials mounted in 5% KOH and from 30 asci, ascospores, and paraphyses for each specimen. Line and point integrated illustrations of internal structures of fruit bodies were drawn using the microscopic painting device (Panasoianic XSJ-2). The type specimen is deposited in the Herbarium of Forest Fungi of Anhui Agricultural University, China (AAUF).

Taxonomy

Terriera huangshanensis Z.Z. Yang, Y.R. Lin **& C.L. Hou, sp. nov.** Figures 1–7

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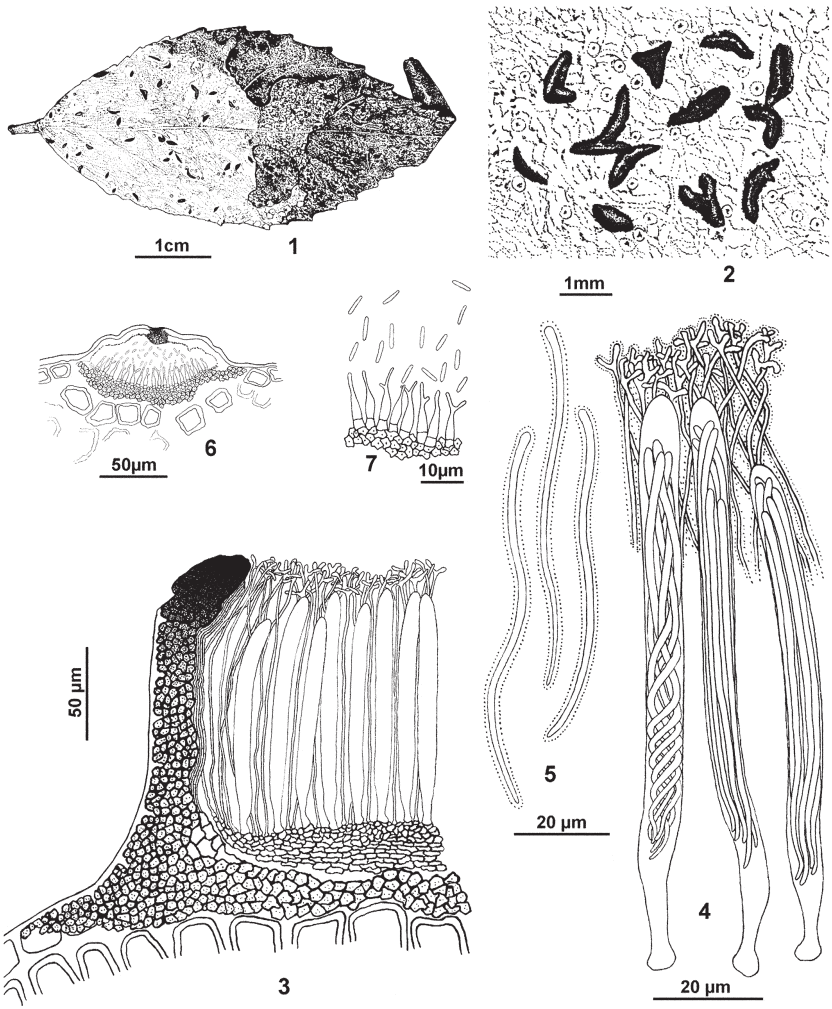
Ascomata amplitudine admodum variabilia, 550–1900 × 200–550 μm, elliptica, subfusiformia vel rimis ternis aperientia. Paraphyses filiformes, ad apicem plerumque gradatim tumidae vel irregulatim semel aut iterum ramosae. Asci in simul maturescentes, 8-spori. Ascosporae 58–90 × 1.5–2 μm, filiformes, hyalinae, aseptatae, vagina gelatinosa 1–1.5 μm crassa indutae.

Type: On leaves of *Eurya muricata* var. *huiana* (Kobuski) Hu & L.K. Ling (Theaceae), China. Anhui, Mt Huangshan, Wenquan. alt. ca 700 m, 12 June 2006, Y. R. Lin et al. L2217 (**Holotype** AAUF68325).

Etymology: *huangshanensis*, referring to the place where the specimen was collected.



Figs 1–7. *Terriera huangshanensis* on fallen leaves of *Eurya muricata* var. *huiana*. 1. Habit on leaf. 2. Detail of ascomata and conidiomata. 3. Portion of ascoma in median vertical section. 4. Paraphyses and asci. 5. Discharged ascospores. 6. Conidioma in vertical section. 7. Conidiogenous cells and conidia.

Ascomata developing on both sides of fallen leaves, principally on the upper side of the leaf, scattered to clustered, sometimes confluent in groups of two or three, in drab or gray-white bleached areas 17–25 mm diam. In surface view, ascomata varied in dimensions, 550–1900 ×200–550 μm, elliptical, fusiform

or subfusiform, straight or curved (lunate), sometimes 3-lobed or triangular, ends rounded to subacute, strongly raised above the surface of the substrate at maturity, opening by a single longitudinal split which is branched in the triangular ascomata. Lips absent, split extending almost the whole length of the ascoma. Entirety of ascomata black, matt or slightly glossy, the edge well defined. In median vertical section, ascomata subepidermal with epidermal cells becoming filled with fungal tissue as ascomata develops, 175–205 µm deep. Covering stroma 18–22 µm thick near the centre of the ascoma, slightly thicker towards the edges, extending to the basal stroma, consisting of dark brown to light black, thick-walled textura angularis and textura globulosa with cells 3.5–5.5 µm diam. Along the edge of the ascoma opening there is a 12–20 µm thick extension adjacent to the covering stroma which covers the hymenium, and which is comprised of strongly carbonized tissue with no obvious cellular structure. Excipulum very poorly developed, closely adhering to sides of the extension and the covering stroma. Basal stroma 10–18 µm thick, dark brown, consisting of 2–4 rows of 4–7 µm diam., angular, thick-walled cells. Subhymenium 15–25 µm thick, composed of hyaline textura angularis and textura porrecta, with a colorless to gray-brown, 12 –30 µm thick, of textura angularis mixed with textura prismatica at the edge of the ascoma. Hymenium often extending beyond the top of the extension when ripening. Paraphyses 120–140 × 1–1.2 µm, filiform, thin-walled, hyaline, branching 1–2 times and slightly swollen at the apex, with a ca 1 µm thick gelatinous matrix, forming a distinct epithecium above the asci. Asci ripening synchronously, 100–120 × 5–7 µm, narrow-cylindrical, thin-walled and equal, apex rounded or subacute, not bluing in iodine, discharging spores through a small apical hole, 8-spored, stalk 15–28 µm in length. Ascospores borne in a fascicle, sometimes helically arranged, 58–90 × 1.5–2 µm, filiform, slightly tapered towards the base, hyaline, aseptate, thin-walled, covered by a 1–1.5 µm thick gelatinous sheath.

Conidiomata on both sides of leaves, predominantly on the upper side, scattered to crowded, sometimes coalescing. In surface view, conidiomata 75–130 × 70–90 µm, round to elliptical, raising the leaf surface, lightly brown but dark brown, grey-brown or dark brown in the regions of the edge and the surrounding of apical ostiole after discharging spores. In vertical section, conidiomata subcuticular, somewhat lenticular in outline, 50–65 µm deep. Upper wall poorly developed, only present in surrounding of the ostiole. Basal wall well-developed, 6–8.5 µm, dark brown, consisting of 2–3 rows of 2–3.5 µm diam., angular, slightly thick-walled cells. Subconidiogenous layer ca 8 µm thick, composed of very light, thin-walled, angular cells. Conidiogenous cells 8–12 × 2–3 µm, cylindrical, slightly tapered towards the apex, hyaline, proliferating sympodially. Conidia 4.5–6 × ca 1 µm, cylindrical, hyaline, aseptate.

Comments —*Terriera huangshanensis* is distinctive within the genus because of the synchronously ripening asci and the hymenium that often overtops the extension of the covering stroma when mature. The most widely distributed species, *T. minor* (Tehon) P.R. Johnst., is similar but differs in many aspects: its ascomata have rounded ends and are not associated with conidiomata and zone lines, the textura prismatica between the covering and basal stroma is poorly developed, asci ripen sequentially, and the ascospores are 0–1 septate and taper slightly towards both ends (Johnston 1988, 1989a, b). The type species *T. cladophila* is distinguished from *T. huangshanensis* by subcuticular, circular to elliptical, non-curved ascomata that are associated with brown diffuse zone lines; the textura prismatica between the covering and basal stroma composed of vertically oriented cells; sequentially ripening asci; and a subhymenium consisting of textura angularis and textura intricata (Minter 1996).

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